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**FIRST QUARTER 1992
QUARTERLY GROUND-WATER
MONITORING REPORT
SIEMENS NUCLEAR POWER CORPORATION
RICHLAND, WASHINGTON**

PROJECT NO. WA183.03

Volume 1

June 8, 1992

Prepared for

**Siemens Nuclear Power Corporation
2101 Horn Rapids Road
Richland, Washington 99352**

Prepared by

**Geraghty & Miller, Inc.
8330 154th Avenue Northeast
Redmond, Washington 98052-3864
(206) 869-6321**

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June 9, 1992

Mr. Robert Stewart
Unit Manager
U.S. Department of Energy
Post Office Box 550, A6-95
Richland, Washington 99352

**RE: First Quarter 1992 Quarterly Ground-Water Monitoring Report
Siemens Nuclear Power Corporation, Richland, Washington**

Dear Bob:

Enclosed are 2 copies of the above-referenced report, prepared by Geraghty & Miller, Inc. for Siemens Nuclear Power Corporation (SNP).

Please call if you have any questions regarding the contents of this report.

Sincerely,

GERAGHTY & MILLER, INC.



Jay P. Bower
Project Engineer/Project Manager

JPB/kkj



Susan J. Keith
Principal Scientist and Associate/
Project Officer

cc: Dave Einan, U.S. Environmental Protection Agency (4)
John Stewart, U.S. Army Corps of Engineers (5)

**FIRST QUARTER 1992
QUARTERLY GROUND-WATER MONITORING REPORT
SIEMENS NUCLEAR POWER CORPORATION
RICHLAND, WASHINGTON**

June 8, 1992

Geraghty & Miller, Inc. is submitting this report to Siemens Nuclear Power Corporation for work performed at their Richland, Washington facility. The report was prepared in conformance with Geraghty & Miller's strict quality assurance/quality control procedures to ensure that the report meets the highest standards in terms of the methods used and the information presented. If you have any questions or comments concerning this report, please contact one of the individuals listed below.

Respectfully submitted,

GERAGHTY & MILLER, INC.

Laurie D. Benton

Laurie D. Benton
Scientist II

Jay P. Bower

Jay P. Bower
Project Engineer II/Project Manager

Susan J. Keith
Principal Scientist and Associate/
Project Officer

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**FIRST QUARTER 1992
QUARTERLY GROUND-WATER MONITORING REPORT
SIEMENS NUCLEAR POWER CORPORATION
RICHLAND, WASHINGTON**

INTRODUCTION

This report documents the first quarter 1992 ground-water sampling effort conducted in accordance with the Phase I Ground-Water Study Work Plan (Work Plan) (Geraghty & Miller 1991a) for the Siemens Nuclear Power Corporation (SNP) fuels fabrication facility in Richland, Washington (Figure 1). The first quarter 1992 sampling effort was conducted in March 1992 and is the second quarterly sampling event for the Phase I Ground-Water Study. Ground-water samples were collected from SNP Wells GM-1 through GM-12 and TW-14 and U.S. Department of Energy (DOE) Well MW-12.

In March and early April, 1992, SNP Wells GM-13 through GM-16 and P-1 through P-3 were installed. These new wells are shown on the figures in this report. These wells were sampled in April and during the second quarter 1992 sample event in May 1992. The results from the April samples will be presented with results from the second quarter ground-water sampling effort.

The following discusses the first quarter 1992 methodology and results.

METHODS

Water-level measurements and ground-water quality samples were collected from SNP Wells GM-1 through GM-12 and TW-14 (Figure 2) between March 9 and 12, 1992 by Geraghty & Miller personnel. Sets of duplicate ground-water samples were collected from DOE Well MW-12 and SNP Well GM-8 in the presence of DOE sampling personnel. The ground-water sampling methodology employed was that outlined in the Phase I Ground-Water Study Sampling and Analysis Plan (SAP) (Geraghty & Miller 1991b). Analytical data were validated in accordance with the Quality Assurance Project

Plan (Geraghty & Miller 1991b), the U.S. Environmental Protection Agency (USEPA) Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses (USEPA 1988a), and the USEPA Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (USEPA 1988b), as applicable.

Water-levels in the wells were measured on March 9, 1992 within a 24-hour period prior to sampling activities (Figure 3). Monitoring well and test well construction and survey data for the SNP and DOE wells of interest are provided in Table 1 and water-level data are provided in Table 2. The static water level in each SNP well was measured with an electric sounder (Slope Indicator Company water level indicator, model 51453). In addition, the total depth of the well was measured using a weighted stainless-steel tape. The measuring point was a notch in or the top of the well casing for which the elevation has been surveyed relative to mean sea level (msl). All water-level and total depth measurements were made by Geraghty & Miller personnel.

From the water-level and total depth measurements, the volume of water in the well was calculated. Then, a minimum of three well volumes of water were evacuated from the well using a nondedicated submersible pump. The pH, specific conductance, and temperature of the discharged water were measured during the purging after each well volume was removed. The pH was considered stable when two consecutive measurements agreed within 0.2 standard units. Temperature was considered stable when two consecutive measurements agreed within 0.2 degrees centigrade. Specific conductance readings were considered stable when two consecutive readings were within 10 percent of each other. If the pH, specific conductance, and temperature did not stabilize within the designated purging volume, then purging continued until the readings stabilized or until the field supervisor indicated that further purging was unnecessary. Purge water was pumped into 55-gallon drums and were held on site, except for the purge water from SNP Wells GM-1 and GM-2 which was deemed uncontaminated based on the fourth quarter 1991 ground-water quality sample results and was discharged to the ground.

Samples were collected for the analyses listed in Table 3 using a Teflon™ bailer. The bailer was lowered on a clean disposable nylon cord and was emptied into the appropriate sample bottles with preservatives using a bottom-emptying Teflon™ spigot. For samples collected for analyses of dissolved metals, the ground water was emptied from the bailer into a clean glass beaker. Then, the sample was drawn through clean silicon tubing and a 0.45-micron filter using a motorized peristaltic pump and discharged into a sample bottle containing nitric acid as a preservative.

Immediately after collection, all samples were recorded on chain-of-custody forms and stored in a cooler with wet ice and frozen reusable ice packs. Coolers of filled sample containers were either relinquished to an overnight-delivery courier for delivery or delivered the next day by sampling personnel to the laboratory for analysis. Appropriate chain-of-custody procedures were followed each time samples were relinquished to either the courier or the laboratory.

Field parameters (pH, specific conductance, and temperature) were measured and recorded on the Water Sampling Logs. The color, odor, appearance, and other observations about the sample were also noted on the Water Sampling Log. Water Sampling Logs are provided in Appendix A.

All nondedicated sampling equipment was decontaminated according to the SAP (Geraghty & Miller 1991b) prior to use and after sampling each well to avoid chemical cross-contamination of ground-water samples.

For the 14 wells sampled, one duplicate was collected for the whole sampling event and one rinsate sample was collected at the end of each sampling day. The deionized water used for the rinsate samples was obtained from the SNP Deionized Water Building. In addition, two trip blanks were analyzed for the sampling event.

Pacific Northwest Environmental Laboratory, Inc. of Redmond, Washington, was contracted to analyze the ground-water samples. The samples were analyzed for the constituents listed in Table 3, with the exception of temperature, specific conductance, and pH, which were analyzed in the field by sampling personnel.

After the data were validated according to the methods cited above, the areal distributions of constituent concentrations were plotted on site maps. These maps are described in the following section.

RESULTS

WATER LEVEL MEASUREMENTS

Figure 3 shows the March 1992 water-level elevations and general water-table surface contours. Ground-water flow was generally to the northeast. The horizontal gradient ranged from approximately 0.003 to 0.0003.

LABORATORY ANALYSES

Analytes, analytical methods, and data quality objectives are listed in Table 3. Laboratory analytical results for organic and inorganic analytes are listed in Table 4 and selected constituents are discussed below. The laboratory reports are provided in Appendix B.

Organic Analytes

Trichloroethene and 1,1,1-Trichloroethane

The distributions of trichloroethene (TCE) and 1,1,1-trichloroethane (TCA) based on analytical results from the March 1992 sampling are shown in Figure 4. TCE was detected in ground-water samples from all the wells, except SNP Well GM-4 and upgradient SNP Wells GM-1 and GM-2. The highest concentration of TCE in a sample from an SNP well was 29 micrograms per liter ($\mu\text{g/L}$) in the sample from SNP Well GM-12, located near the South Pit. The South Pit area is part of the Horn Rapids Landfill located northeast of the SNP facility on the south side of Horn Rapids Road. TCE concentrations in samples from SNP Wells GM-3, GM-5 through GM-11, and TW-14 ranged from 9 $\mu\text{g/L}$ to 22 $\mu\text{g/L}$. TCA concentrations ranged from nondetectable to 4 $\mu\text{g/L}$. TCA was not detected in samples from SNP Wells GM-7, GM-8, GM-10, GM-11, GM-12, or from upgradient SNP Wells GM-1 and GM-2. The sample from DOE Well MW-12 had a TCE concentration of 70 $\mu\text{g/L}$ and a TCA concentration of 2 $\mu\text{g/L}$.

Other Organic Analytes

Acetone was detected in the samples from SNP Wells GM-2, GM-7, and GM-8 and DOE Well MW-12 at concentrations ranging from 6 $\mu\text{g/L}$ to 31 $\mu\text{g/L}$ and chloroform was detected in the sample from SNP Well GM-4 at a concentration of 3 $\mu\text{g/L}$. Toluene was detected in samples from SNP Wells GM-6 and GM-7 at 1 $\mu\text{g/L}$. Benzene and xylene (total) were detected in the sample from SNP Well GM-6 at concentrations of 1 $\mu\text{g/L}$. Methylene chloride was detected in samples from SNP Wells GM-1 through GM-3, GM-5 through GM-9, and GM-11 and DOE Well MW-12 at concentrations ranging from 1 $\mu\text{g/L}$ to 2 $\mu\text{g/L}$. 1,1,2,2-tetrachloroethane was not detected in any of the ground-water samples this quarter.

Inorganic Analytes

Nitrate and Ammonia

The distributions of nitrate and ammonia based on March 1992 analytical results are shown in Figure 5. Nitrate concentrations ranged from 5.07 milligrams per liter (mg/L) to 45.9 mg/L (expressed as nitrogen, $\text{NO}_3\text{-N}$) in SNP Wells GM-3 through GM-12 and TW-14. Samples from upgradient SNP Wells GM-1 and GM-2 contained 4.45 mg/L and 6.52 mg/L, respectively. Ammonia concentrations based on the March 1992 sampling ranged from not detected above the detection limit of 0.050 mg/L to 41.2 mg/L (expressed as nitrogen, $\text{NH}_3\text{-N}$) in SNP Wells GM-3 through GM-12 and TW-14. Ammonia was not detected in samples from upgradient SNP Wells GM-1 and GM-2. The sample from DOE Well MW-12 had a nitrate concentration of 46.2 mg/L; ammonia was not detected.

Fluoride

The distribution of fluoride based on March 1992 analytical results is shown in Figure 6. Fluoride concentrations ranged from 0.198 mg/L to 10.2 mg/L in SNP Wells GM-3 through GM-12 and TW-14. Samples from upgradient SNP Wells GM-1 and GM-2 contained 0.253 mg/L and 0.250 mg/L, respectively. The sample from DOE Well MW-12 had a fluoride concentration of 0.348 mg/L.

Radionuclides

The distributions of gross-alpha and gross-beta concentrations based on the March 1992 analytical results are shown in Figure 7. Gross alpha concentrations ranged from 1.9 ± 3.7 picocuries per liter (pCi/L) to 78 ± 9 pCi/L in SNP Wells GM-3 through GM-12 and TW-14. Samples from upgradient SNP Wells GM-1 and GM-2 contained 2.9 ± 3.1 pCi/L and 1.6 ± 2.2 pCi/L, respectively. Gross beta concentrations ranged

from 12 ± 2 pCi/L to 87 ± 4 pCi/L in SNP Wells GM-3 through GM-12 and TW-14. Samples from upgradient SNP Wells GM-1 and GM-2 contained 12 ± 3 pCi/L and 5.5 ± 2.0 pCi/L, respectively. The sample from DOE Well MW-12 had a gross alpha concentrations of 6.8 ± 5.6 pCi/L and a gross beta concentration of 80 ± 7 pCi/L.

DATA VALIDATION

The data validation report is provided in Appendix C and the results of data validation are listed in Table 5. The following section discusses the data validation for specific analytes.

Organic Analyses

Acetone

Acetone was detected in both of the trip blanks and one of the equipment blanks. Sample results above the Instrument Detection Limit (IDL) associated with these blanks were flagged with a "U" because they are less than 10 times the amount detected in the associated blank (USEPA 1988a). Acetone is a common laboratory contaminant (USEPA 1988a) and may have been introduced into the samples at the laboratory.

Methylene chloride

Methylene chloride was detected in one of the trip blanks, one of the laboratory method blanks, and all of the equipment blanks (rinsates). Sample results above the IDL associated with these blanks were flagged with a "U" because they are less than ten times the amount detected in the associated blank (USEPA 1988a). Methylene chloride is a common laboratory contaminant (USEPA 1988a) and may have been introduced into the samples at the laboratory.

Other Organic Analytes

Chloroform was detected in all four equipment blanks. Only the sample result from SNP Well GM-4 was above the IDL. Since that result is less than five times the concentration of chloroform in the blank, it is qualified with a "U" (USEPA 1988b).

Inorganic Analyses

Ortho-Phosphate

One of the laboratory duplicates for ortho-phosphate has a relative percent difference outside of quality control limits. Hence, the associated samples are flagged as estimated with a "J" (USEPA 1988b).

Metals

Iron was detected in one of the equipment blanks. Only two associated results, those of the samples from SNP Well GM-2 and DOE Well MW-12 are above the IDL. Since these results are less than five times the concentration of iron in the blank, they are flagged with a "U" (USEPA 1988b).

Calcium, iron, magnesium, potassium, and sodium were detected in one or more of the laboratory preparation blanks. Associated samples that have results above the IDL, but are less than five times the concentration in the blank are flagged with a "U" (USEPA 1988b).

Barium, calcium, iron, magnesium, manganese, and sodium were detected in a number of samples at concentrations above the IDL, but below the Contract Required Detection Limit (CRDL). Hence, these results are flagged with a "B".

Field Parameters

All specific conductance data for this sampling event are flagged as estimated because the sampling personnel were unable to perform a two-point calibration for the conductivity meter.

REFERENCES

- Geraghty & Miller, Inc. 1991a. Work Plan, Phase I Ground-Water Study, Siemens Nuclear Power Corporation, Richland, Washington, September 1991.
- _____. 1991b. Sampling and Analysis Plan, Phase I Ground-Water Study, Siemens Nuclear Power Corporation, Richland, Washington, September 1991.
- U.S. Environmental Protection Agency. 1988a. Laboratory Data Validation Functional Guidelines for Organic Analyses, February 1988.
- _____. 1988b. Laboratory Data Validation Functional Guidelines for Inorganic Analyses, July 1988.

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TABLES

TABLE 1a. MONITORING WELL CONSTRUCTION SUMMARY
 SIEMENS NUCLEAR POWER CORPORATION, RICHLAND, WASHINGTON
 PROJECT NO. WA183.03/06

Well ID	Well Diameter (in)	Date Installed	Screened Interval (ft bls)	Boring Depth (ft bls)	Measuring Point Elevation (ft mls)	Concrete Pad Elevation (ft mls)	North Coordinate (ft) *	East Coordinate (ft) *	Well Type
PW-1	6	14-Apr-92	11.6 - 26.9	30.1	367.96	365.60	372,875	2,303,300	Stainless steel screen and steel riser
P-1	2	31-Mar-92	43.0 - 58.0	76.5	417.88	416.21	370,930	2,299,692	Stainless steel screen/PVC riser
P-2	2	02-Apr-92	8.2 - 23.2	24.0	367.67	366.21	373,423	2,302,087	Stainless steel screen/PVC riser
P-3	2	27-Mar-92	62.8 - 72.8	73.5	369.91	368.63	371,733	2,302,440	Stainless steel screen/PVC riser
GM-1	2	16-Oct-91	14.8 - 34.8	35.0	375.44	374.04	371,320	2,303,233	Stainless steel screen/PVC riser
GM-2	2	15-Oct-91	7.3 - 27.3	28.5	370.09	368.49	371,746	2,302,437	Stainless steel screen/PVC riser
GM-3	2	24-Oct-91	10.8 - 30.8	33.0	370.85	371.16	372,300	2,302,894	Stainless steel screen/PVC riser
GM-4	2	23-Oct-91	8.3 - 28.3	28.5	369.66	368.36	372,753	2,303,001	Stainless steel screen/PVC riser
GM-5	2	23-Oct-91	4.8 - 24.8	25.0	367.41	365.80	372,865	2,303,321	Stainless steel screen/PVC riser
GM-6	2	23-Oct-91	20.0 - 40.0	40.2	380.87	379.47	372,776	2,303,864	Stainless steel screen/PVC riser
GM-7	2	22-Oct-91	20.4 - 40.4	40.6	380.89	379.61	373,030	2,303,807	Stainless steel screen/PVC riser
GM-8	2	21-Oct-91	12.8 - 32.8	33.0	372.48	370.92	373,145	2,303,534	Stainless steel screen/PVC riser
GM-9	2	18-Oct-91	8.9 - 28.9	30.0	371.04	371.04	373,432	2,303,337	Stainless steel screen/PVC riser
GM-10	2	18-Oct-91	13.8 - 33.8	35.0	376.33	374.82	373,435	2,303,651	Stainless steel screen/PVC riser
GM-11	2	17-Oct-91	27.8 - 47.8	48.0	381.84	380.19	373,454	2,303,942	Stainless steel screen/PVC riser
GM-12	2	17-Oct-91	29.0 - 49.0	49.2	388.78	387.23	373,442	2,304,243	Stainless steel screen/PVC riser
GM-13	2	24-Mar-92	22.2 - 42.2	50.0	384.14	382.67	372,591	2,304,151	Stainless steel screen/PVC riser
GM-14	2	03-Apr-92	8.6 - 28.6	29.3	371.81	372.24	371,995	2,302,764	Stainless steel screen/PVC riser
GM-15	2	06-Apr-92	9.1 - 29.6	30.0	365.51	369.35	372,388	2,303,039	Stainless steel screen/PVC riser
GM-16	2	30-Mar-92	15.0 - 35.0	42.0	375.43	374.31	372,866	2,303,593	Stainless steel screen/PVC riser

* North American Datum 1927 (NAD 27)
 ft Feet
 ft msl Feet above mean sea level
 ft bls Feet below land surface
 in Inches
 NA Not available/Not applicable

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TABLE 1b. MONITORING WELL CONSTRUCTION SUMMARY
SIEMENS NUCLEAR POWER CORPORATION, RICHLAND, WASHINGTON
PROJECT NO. WA183.03/06

Well ID	Well Diameter (in)	Date Installed	Screened Interval (ft bls)	Boring Depth (ft bls)	Measuring Point Elevation (ft mls)	Ground Elevation (ft mls)	North Coordinate (ft)*	East Coordinate (ft)*	Well Type
TW-1	6	1973	NA	NA	367.00	366.2	372,769	2,303,158	Steel screen and riser
TW-2	6	1973	NA	NA	370.00	368.5	372,769	2,303,443	Steel screen and riser
TW-3	6	1973	NA	NA	369.52	366.7	372,527	2,303,443	Steel screen and riser
TW-4	6	1973	NA	NA	371.04	369.6	372,385	2,303,443	Steel screen and riser
TW-5	6	1974	NA	NA	371.13	368.1	372,255	2,303,443	Steel screen and riser
TW-6	6	1974	NA	NA	366.15	363.7	372,141	2,303,443	Steel screen and riser
TW-7	6	1974	NA	NA	367.15	364.5	371,967	2,303,443	Steel screen and riser
TW-8	6	1974	NA	NA	372.44	371.8	372,623	2,302,676	Steel screen and riser
TW-9	6	Dec-77	NA	NA	367.84	365.8	372,951	2,303,284	Steel screen and riser
TW-11	6	Jan-78	NA	NA	373.12	371.4	371,981	2,303,182	Steel screen and riser
TW-12	6	1979	NA	NA	374.15	371.7	371,986	2,303,307	Steel screen and riser
TW-13	6	1979	NA	NA	375.07	372.5	371,714	2,303,307	Steel screen and riser
TW-14	6	1980	NA	NA	370.25	368.4	373,448	2,303,389	Steel screen and riser
TW-15	6	1980	NA	NA	370.65	369.0	373,444	2,303,529	Steel screen and riser
TW-16	6	NP	NA	NA	376.77	375.2	373,447	2,303,693	Steel screen and riser
TW-17	6	1982	NA	NA	379.36	377.4	373,309	2,303,809	PVC screen and riser
TW-18	6	1982	NA	NA	377.27	375.4	373,431	2,303,679	PVC screen and riser
TW-19	6	Apr-90	NA	NA	381.15	378.2	372,774	2,303,767	Steel screen and riser
TW-20	6	Apr-90	NA	NA	381.43	378.5	372,581	2,303,767	Steel screen and riser
TW-21	6	Apr-90	NA	NA	380.47	377.5	372,372	2,303,768	Steel screen and riser
TW-22	6	Apr-90	NA	NA	374.95	371.6	371,586	2,303,410	Steel screen and riser
TW-23	6	Apr-90	NA	25.2	373.25	371.4	371,556	2,302,499	Steel screen and riser
TW-24	6	Apr-90	NA	23.2	373.36	370.1	372,117	2,302,282	Steel screen and riser
TW-25	6	Apr-90	NA	NA	371.92	368.5	372,619	2,302,040	Steel screen and riser
TW-26	6	Apr-90	NA	NA	367.70	365.4	372,894	2,303,257	Steel screen and riser

* North American Datum 1927 (NAD 27)
ft Feet
ft msl Feet above mean sea level
ft bls Feet below land surface
in Inches
NA Not available/Not applicable

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TABLE 1c. MONITORING WELL CONSTRUCTION SUMMARY
 SIEMENS NUCLEAR POWER CORPORATION, RICHLAND, WASHINGTON
 PROJECT NO. WA183.03/06

Well ID	Well Diameter (in)	Date Installed	Screened Interval (ft bls)	Boring Depth (ft bls)	Measuring Point Elevation (ft msl)	Concrete Pad Elevation (ft msl)	North Coordinate (ft) *	East Coordinate (ft) *	Well Type
MW-2	4	02-Feb-90	21.3 - 41.7	51.0	382.38	379.36	370,933	2,305,244	Stainless steel screen and riser
MW-8	4	15-Dec-89	13.6 - 34.2	34.7	374.75	371.62	373,851	2,302,957	Stainless steel screen and riser
MW-9	4	03-Feb-90	69.3 - 79.3	81.4	375.78	371.86	373,815	2,302,996	Stainless steel channel pak and riser
MW-10	4	17-Nov-89	36.3 - 56.3	67.5	392.29	389.09	375,315	2,304,958	Stainless steel screen and riser
MW-11	4	27-Dec-89	34.3 - 54.7	58.5	392.07	388.69	375,003	2,304,984	Stainless steel channel pak and riser
MW-12	4	17-Jan-90	26.5 - 46.9	59.2	384.57	381.14	374,775	2,305,294	Stainless steel channel pak and riser
MW-13	4	12-Jan-90	26.2 - 41.5	44.0	383.71	379.85	374,559	2,305,279	Stainless steel channel pak and riser
MW-14	4	07-Jan-90	43.5 - 53.5	60.5	382.91	380.01	374,577	2,305,303	Stainless steel channel pak and riser
MW-15	4	07-Dec-90	20.0 - 40.3	54.0	380.58	377.43	374,285	2,305,304	Stainless steel screen and riser
MW-19	4	26-Jun-91	29.9 - 50.9	54.0	386.90	384.56	373,166	2,305,947	Stainless steel screen and riser
MW-20	4	18-Jun-91	24.1 - 45.1	67.7	385.68	383.45	376,009	2,305,988	Stainless steel screen and riser
MW-21	4	09-Jul-91	88.5 - 98.5	98.5	383.41	379.45	374,536	2,305,300	Stainless steel screen and riser
MW-22	4	12-Jun-91	30.3 - 50.3	63.0	387.50	385.07	374,585	2,306,806	Stainless steel screen and riser

* North American Datum 1927 (NAD 27)
 ft Feet
 ft msl Feet above mean sea level
 ft bls Feet below land surface
 in Inches
 NA Not available/Not applicable

TABLE 2a. WATER-LEVEL ELEVATIONS OF SIEMENS NUCLEAR POWER CORPORATION WELLS
SIEMENS NUCLEAR POWER CORPORATION, RICHLAND, WASHINGTON
PROJECT NO. WA183.03

Date of Measurement	Water-Level Elevations (ft msl)							
	19-Jul-90	11-Sep-90	18-Jul-91	11/12-Nov-91	16-Dec-91	13-Jan-92	12-Feb-92	9-Mar-92
Well Number								
GM-1	NA	NA	NA	355.49	355.34	355.20	355.00	354.83
GM-2	NA	NA	NA	355.45	355.35	355.24	355.08	354.93
GM-3	NA	NA	NA	355.30	355.19	355.08	354.94	354.79
GM-4	NA	NA	NA	355.05	354.97	354.88	354.73	354.59
GM-5	NA	NA	NA	354.84	354.89	354.80	354.65	354.51
GM-6	NA	NA	NA	354.92	354.92	354.82	354.66	354.52
GM-7	NA	NA	NA	354.74	354.78	354.69	354.55	354.42
GM-8	NA	NA	NA	354.67	354.73	354.64	354.50	354.38
GM-9	NA	NA	NA	354.66	354.61	354.54	354.42	354.30
GM-10	NA	NA	NA	354.64	354.57	354.49	354.37	354.25
GM-11	NA	NA	NA	354.28	354.34	354.27	354.14	354.02
GM-12	NA	NA	NA	353.97	354.01	353.92	353.78	353.68
GM-13	NA	NA	NA	NA	NA	NA	NA	NA
GM-14	NA	NA	NA	NA	NA	NA	NA	NA
GM-15	NA	NA	NA	NA	NA	NA	NA	NA
GM-16	NA	NA	NA	NA	NA	NA	NA	NA
P-1	NA	NA	NA	NA	NA	NA	NA	NA
P-2	NA	NA	NA	NA	NA	NA	NA	NA
P-3	NA	NA	NA	NA	NA	NA	NA	NA
PW-1	NA	NA	NA	NA	NA	NA	NA	NA
TW-1	353.50	354.08	354.2	355.00	355.02	354.94	354.78	354.65
TW-2	353.52	354.04	354.2	355.00	355.02	354.92	354.77	354.63
TW-3	353.55	354.12	354.31	355.22	355.11	355.01	354.85	354.70
TW-4	353.56	354.19	354.33	355.13	355.15	355.04	354.87	354.72
TW-5	353.59	354.19	354.35	355.16	355.17	355.07	354.89	354.74
TW-6	353.62	354.23	354.44	355.21	355.22	355.11	354.93	354.77
TW-7	353.57	354.28	354.46	355.40	355.27	355.14	354.98	354.79
TW-8	NA	NA	354.36	355.13	355.17	355.08	354.93	354.79
TW-9	353.53	354.03	354.15	354.92	354.97	354.90	354.74	354.60
TW-11	353.58	354.29	354.43	355.24	355.26	355.15	354.96	354.80
TW-12	353.65	354.30	354.47	355.27	355.27	355.15	354.97	354.81
TW-13	353.62	354.36	354.57	355.29	355.35	355.21	355.03	354.83
TW-14	353.14	353.79	353.78	354.65	354.59	354.54	354.40	354.28
TW-15	353.15	354.67	353.75	354.52	354.59	354.51	354.38	354.27
TW-16	353.29	354.85	353.95	354.72	354.77	354.71	354.58	353.76
TW-17	NA	NA	355.84	354.68	354.74	354.67	354.54	354.27
TW-18	NA	NA	351.66	354.55	354.60	354.54	354.41	354.25
TW-19	353.42	354.11	354.24	355.03	355.06	354.96	354.81	354.66
TW-20	353.53	354.12	354.32	355.10	355.11	355.03	354.86	354.71
TW-21	353.57	354.20	354.37	355.23	355.22	355.11	354.93	354.73
TW-22	353.63	354.31	354.46	355.25	355.24	355.10	354.91	354.73
TW-23	353.75	354.38	354.56	355.48	355.41	355.29	355.13	354.98
TW-24	353.71	354.32	354.48	355.36	355.31	355.21	355.05	354.90
TW-25	353.88	354.38	354.6	355.30	355.38	355.29	355.16	355.02
TW-26	353.53	354.05	354.19	354.96	354.99	354.91	354.77	354.63

ft msl Feet relative to mean sea level
btopc Below top of casing
NA Not available/not applicable

TABLE 2b. WATER-LEVEL ELEVATIONS OF U.S. DEPARTMENT OF ENERGY 1100-EM-1 UNIT WELLS
HANFORD RESERVATION, RICHLAND, WASHINGTON
PROJECT NO. WA183.03

		Water-Level Elevations (ft msl)							
Date of Measurement		27-Jul-90	24-Sep-90	26-Jul-91	25-Nov-91	16-Dec-91	13-Jan-92	13-Feb-92	10/11/12-Mar-92
Well Number									
699-S34-E10	MW-2	352.84	353.36	354.18	353.62	354.43	353.72	353.18	352.94
699-S31-E08	MW-8	353.03	353.30	353.59	354.31	354.39	354.30	354.17	NA
699-S32-E08	MW-9	358.92	359.07	359.36	360.06	360.09	360.35	359.99	NA
699-S30-E10	MW-10	348.98	348.87	349.14	349.66	349.73	349.40	349.15	348.97
699-S30-E10	MW-11	349.39	349.37	349.58	356.88	350.15	349.92	349.73	349.56
699-S31-E10	MW-12	348.71	348.50	348.90	341.81	349.33	348.96	348.66	348.44
699-S31-E10	MW-13	349.24	349.17	349.45	350.08	350.02	349.72	349.43	NA
699-S31-E10	MW-14	349.16	349.08	349.38	349.99	349.87	349.64	349.42	349.72
699-S31-E10	MW-15	349.05	348.97	349.30	349.92	349.87	349.49	349.19	348.99
699-S32-E11	MW-19	NA	NA	NA	NA	351.08	350.69	350.69	349.78
699-S29-E11	MW-20	NA	NA	NA	NA	347.35	347.00	347.00	NA
699-S31-E10	MW-21	NA	NA	NA	NA	349.42	349.14	349.14	NA
699-S31-E11	MW-22	NA	NA	NA	NA	347.17	346.58	346.58	NA

ft msl Feet relative to mean sea level
btopc Below top of casing
NA Not available/not applicable

TABLE 3. SUMMARY OF ANALYTES, METHODS, AND DATA QUALITY OBJECTIVES FOR GROUND-WATER MONITORING
SIEMENS NUCLEAR POWER CORPORATION FACILITY, RICHLAND, WASHINGTON
PROJECT NO. WA183.03

Analyte	Method	CRQL (1)	G&M QA Level (2)	Precision Criteria (3)	Accuracy Criteria (3)
Volatile Organics	624-CLP-M (4)	2 ug/L	IV	25	75-125
Ammonia as Nitrogen	350.3 (5)	50 ug/L	III	20	75-125
Barium	200.7 (5)	200 ug/L	IV	20	75-125
Calcium	200.7 (6)	5000 ug/L	IV	20	75-125
Iron	200.7 (6)	100 ug/L	IV	20	75-125
Magnesium	200.7 (6)	5000 ug/L	IV	20	75-125
Manganese	200.7 (6)	15 ug/L	IV	20	75-125
Potassium	200.7 (6)	5000 ug/L	IV	20	75-125
Sodium	200.7 (6)	5000 ug/L	IV	20	75-125
Chloride	300.0 (7)	10000 ug/L	III	20	75-125
Fluoride	340.2 (8)	100 ug/L	III	20	75-125
Nitrate as Nitrogen	300.0 (7)	100 ug/L	III	20	75-125
Phosphate	300.0 (7)	500 ug/L	III	20	75-125
Sulfate	300.0 (7)	2000 ug/L	III	20	75-125
Alkalinity	310.1 (5)	10000 ug/L	III	20	75-125
Acidity	305.1 (5)	10000 ug/L	III	20	75-125
Gross alpha	900.0 (9)	7.5 pCi/L	III	20	75-125
Gross beta	900.0 (9)	25 pCi/L	III	20	75-125
Total Dissolved Solids	160.1 (8)	10 mg/L	III	20	75-125
Temperature	(10)	NA	NA	NA	NA
pH	(10)	NA	NA	NA	NA
Specific conductance	(10)	NA	NA	NA	NA

- (1) CRQL is the contract-required quantitation limit; values are to be considered requirements in the absence of known or suspected analytical interferences.
- (2) Level IV reporting includes a full laboratory report as required by the USEPA Contract Laboratory Program (CLP). Level III reporting includes a full CLP data package except for raw spectra and laboratory bench data sheets used to prepare quality assurance documents.
- (3) Precision is expressed as a relative percent difference between results of duplicate or replicate analyses; accuracy is expressed as percent recovery of an analyte. These limits apply to sample results greater than five times the CRQL and are to be considered requirements in the absence of known or suspected analytical interferences.
- (4) Method described in 40 CFR 135, Appendix A.
- (5) Method described in Methods for Chemical Analysis of Water and Wastes, EPA 600/4-79-020, 1979.
- (6) Method described in 40 CFR 136, Appendix C.
- (7) Method described in Determination of Inorganic Anions in Aqueous and Solid Samples of Ion Chromatography, EPA-600/4-84-017, 1984.
- (8) Method described in Methods for Chemical Analysis of Water and Wastes, EPA 600/4-79-020, 1979, Revised 1983.
- (9) Method described in Prescribed Procedures for Measurement of Radioactivity in Drinking Water, EPA-600/4-80-032, 1980.
- (10) Measured in the field according to instrument manufacturer's instructions.

ug/L Micrograms per liter
pCi/L Picocuries per liter
NA Not applicable

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TABLE 4a. VOLATILE ORGANIC ANALYTES
ANALYTICAL RESULTS FOR GROUND-WATER SAMPLES
SIEMENS NUCLEAR POWER CORPORATION FACILITY, RICHLAND, WASHINGTON
PROJECT NO. WA183.03

Well Number	Date Sampled	TCE (ug/L)	TCA (ug/L)	Acetone (ug/L)	Chloroform (ug/L)	Toluene (ug/L)	Methylene Chloride (ug/L)	Benzene (ug/L)	Xylene (total) (ug/L)	1,1,2,2-Tetrachloroethane (ug/L)
GM-1	11-12-91	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U
	03-09-92	1 U	1 U	17 U	1 U	1 U	2 U	1 U	1 U	1 U
GM-2	11-12-91	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U
	03-10-92	1 U	1 U	6 U	1 U	1 U	2 U	1 U	1 U	1 U
GM-3	11-12-91	22 B	5	2 U	1 U	1 U	1 U	1 U	1 U	1 U
	03-12-92	15	4	2 U	1 U	1 U	1 U	1 U	1 U	1 U
GM-4	11-12-91	2 U	3	2 U	2 U	1 U	1 U	1 U	1 U	5
	03-12-92	1 U	2	2 U	3 U	1 U	1 U	1 U	1 U	1 U
GM-5	11-13-91	22 B	2	3 U	1 U	1 U	1 U	1 U	1 U	1 U
	11-13-91*	21 B	2	2 U	1 U	1 U	1 U	1 U	1 U	1 U
	03-12-92	14	1	2 U	1 U	1 U	2 U	1 U	1 U	1 U
	03-12-92*	12	1	2 U	1 U	1 U	1 U	1 U	1 U	1 U
GM-6	11-13-91	12 B	3	2 U	1 U	1 U	1 U	1 U	1 U	1 U
	03-10-92	18	1	2 U	1 U	1	2 U	1	1	1 U
GM-7	11-13-91	13 B	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U
	03-11-92	15	1 U	31 U	1 U	1	2 U	1 U	1 U	1 U
GM-8	11-13-91	13 B	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U
	03-11-92	22	1 U	7 U	1 U	1 U	2 U	1 U	1 U	1 U
GM-9	11-13-91	10 B	3	2 U	1 U	1 U	1 U	1 U	1 U	1 U
	03-11-92	9	2	2 U	1 U	1 U	1 U	1 U	1 U	1 U
GM-10	11-13-91	21 B	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U
	03-11-92	18	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U
GM-11	11-13-91	23 B	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U
	03-11-92	17	1 U	2 U	1 U	1 U	2 U	1 U	1 U	1 U
GM-12	11-13-91	35 B	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U
	03-12-92	29	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U
MW-12	11-12-91	64 B	2	2 U	1 U	1 U	1 U	1 U	1 U	6
	03-10-92	70	2	6 U	1 U	1 U	1 U	1 U	1 U	1 U
TW-14	03-12-92	10	1	2 U	1 U	1 U	1 U	1 U	1 U	1 U
RINSATE	11-12-91	1 U	1 U	4 U	22	1 U	1 U	1 U	1 U	1 U
	11-13-91	1 U	1 U	2 U	16	1 U	1 U	1 U	1 U	1 U
	03-09-92	1 U	1 U	2 U	17	1 U	1 U	1 U	1 U	1 U
	03-10-92	1 U	1 U	12 U	16	1 U	2 U	1 U	1 U	1 U
	03-11-92	1 U	1 U	2 U	30	1 U	2 U	1 U	1 U	1 U
	03-12-92	1 U	1 U	9 U	28	1 U	2 U	1 U	1 U	1 U
TRIP BLANK	11-12-91	1 U	1 U	4 U	1 U	1 U	2	1 U	1 U	1 U
	11-13-91	1 U	1 U	2 U	1 U	1 U	1 U	1 U	1 U	1 U
	03-09-92	1 U	1 U	13	1 U	1 U	1 U	1 U	1 U	1 U
	03-11-92	1 U	1 U	20	1 U	1 U	3 U	1 U	1 U	1 U

U Not detected above given detection limit.

J Estimated value.

B Compound found in associated blank as well as in the sample.

TCE Trichloroethene.

TCA 1,1,1-Trichloroethane.

ug/L Micrograms per liter.

* Duplicate sample from GM-5. November 1991 and March 1992 duplicates are labeled GM-13 and TW-27, respectively, in the field and lab records.

TABLE 4b. DISSOLVED METALS
ANALYTICAL RESULTS FOR GROUND-WATER SAMPLES
SIEMENS NUCLEAR POWER CORPORATION FACILITY, RICHLAND, WASHINGTON
PROJECT NO. WA183.03

Well Number	Date Sampled	Barium (ug/L)		Calcium (ug/L)		Iron (ug/L)		Magnesium (ug/L)		Manganese (ug/L)		Potassium (ug/L)		Sodium (ug/L)	
GM-1	11-12-91	30.3	B	37,500		25.0	UJ	9,290		5.7	B	4,400	B	15,700	
	03-09-92	36.6	B	39,900		35.7	B	9,550		5.2	B	5,040		15,600	
GM-2	11-12-91	36.9	B	38,300		25.0	UJ	9,320		5.0	U	4,350	B	19,100	
	03-10-92	38.5	B	47,900		40.9	U	11,500		5.0	U	5,110		17,600	
GM-3	11-12-91	70.6	B	59,800		25.0	UJ	12,600		11.4	B	9,630		22,400	
	03-12-92	64.5	B	57,000		25.6	U	11,500		7.7	B	8,710		23,600	
GM-4	11-12-91	55.8	B	53,300		25.0	UJ	14,100		7.4	B	4,880	B	18,300	
	03-12-92	49.3	B	63,100		25.0	U	16,100		5.0	B	5,370		17,700	
GM-5	11-13-91	72.9	B	34,700		25.0	UJ	14,100		29.6		7,930		23,800	
	11-13-91*	70.8	B	35,900		25.0	UJ	14,400		29.6		8,610		23,500	
	03-12-92	88.5	B	55,000		25.0	U	22,400		44.7		8,360		29,700	
	03-12-92*	89.0	B	55,000		25.0	U	22,700		43.6		8,530		31,000	
GM-6	11-13-91	44.7	B	47,500		29.9	UJ	11,300		13.4	B	5,980		19,600	
	03-10-92	46.3	B	59,100		25.0	U	14,000		5.1	B	6,460		21,200	
GM-7	11-13-91	37.2	B	44,000		46.3	UJ	10,600		5.0	U	5,090		18,300	
	03-11-92	41.8	B	54,300		25.0	U	12,900		5.0	U	6,090		20,600	
GM-8	11-13-91	58.4	B	37,900		25.0	UJ	11,200		36.3		6,440		20,100	
	03-11-92	82.8	B	61,000		53.5	B	15,300		10.4	B	7,350		23,500	
GM-9	11-13-91	99.5	B	59,000		56.4	UJ	15,400		13.6	B	12,900		47,400	
	03-11-92	102	B	64,200		25.0	U	16,600		8.0	B	14,000		50,300	
GM-10	11-13-91	67.0	B	38,800		27.1	UJ	10,600		71.2		7,600		20,600	
	03-11-92	78.7	B	51,800		25.0	U	14,000		66.2		9,040		23,700	
GM-11	11-13-91	37.2	B	55,500		25.0	UJ	12,600		5.0	U	6,150		21,400	
	03-11-92	39.6	B	61,100		126		14,100		5.0	B	6,430		22,400	
GM-12	11-13-91	80.1	B	61,200		28.4	UJ	13,000		22.0		10,600		20,800	
	03-12-92	83.4	B	69,900		25.9	U	14,700		11.3	B	10,800		21,600	
MW-12	11-12-91	108	B	112,000		37.7	BJ	23,200		6.4	B	9,070		30,600	
	03-10-92	105	B	110,000		57.2	U	23,400		8.7	B	9,300		32,400	
TW-14	03-12-92	82.3	B	50,700		25.0	U	12,600		10.1	B	14,300		54,400	
RINSATE	11-12-91	15.0	U	40.0	U	25.0	UJ	40.0	U	5.0	U	400	U	406	B
	11-13-91	15.0	U	40.0	U	25.0	UJ	40.0	U	5.0	U	400	U	119	B
	03-09-92	20.0	U	67.4	B	25.0	U	44.7	B	5.0	U	500	U	124	U
	03-10-92	20.0	U	157	B	33.4	B	55.6	B	5.0	U	400	U	231	B
	03-11-92	20.0	U	61.0	B	25.0	U	40.0	U	5.0	U	408	U	199	U
	03-12-92	20.0	U	82.5	U	25.0	U	50.2	U	5.0	U	685	U	124	U

U Not detected above given detection limit.

J Estimated value.

B Result above the Instrument Detection Limit, but is below the Contract Required Detection Limit.

ug/L Micrograms per liter.

* Duplicate sample from GM-5. November 1991 and March 1992 duplicates are labeled GM-13 and TW-27, respectively, in the field and lab records.

TABLE 4c. ANIONS AND AMMONIA
ANALYTICAL RESULTS FOR GROUND-WATER SAMPLES
SIEMENS NUCLEAR POWER CORPORATION FACILITY, RICHLAND, WASHINGTON
PROJECT NO. WA183.03

Well Number	Date Sampled	Chloride (mg/L)	Fluoride (mg/L)	Nitrate as N (mg/L)	Ortho-Phosphate (mg/L)	Sulfate (mg/L)	Ammonia as N (mg/L)
GM-1	11-12-91	10.1	0.300	4.26	0.100 U	28.0	0.041
	03-09-92	10.8	0.253	4.45	0.100 U	32.8	0.050 U
GM-2	11-12-91	8.26	0.335	3.87	0.100 U	21.1	0.035
	03-10-92	11.6	0.250	6.52	0.100 U	33.4	0.050 U
GM-3	11-12-91	38.0	1.31	11.4	0.235	17.9	0.042
	03-12-92	18.2	1.04	8.71	0.201	23.7	0.050 U
GM-4	11-12-91	10.5	0.910	19.0	0.100 U	11.5	0.037 J
	03-12-92	17.6	0.526	22.1	0.100 U	22.7	0.050 U
GM-5	11-13-91	8.92	7.10	26.0	0.100 U	60.7	45.0
	11-13-91*	8.64	7.20	9.96	0.100 U	58.6	46.9
	03-12-92	10.6	5.15	37.1	0.100 U	78.1	38.9
	03-12-92*	10.4	6.25	36.0	0.100 U	68.6	41.2
GM-6	11-13-91	11.4	0.333	6.43	0.100 U	30.5	0.030
	03-10-92	13.4	0.231	6.46	0.100 U	43.5	0.050 U
GM-7	11-13-91	12.8	0.254	5.46	0.100 U	29.9	0.030
	03-11-92	14.5	0.231	8.66	0.100 UJ	36.8	0.050 U
GM-8	11-13-91	10.4	2.10	15.5	0.108	33.4	5.23
	03-11-92	10.7	1.75	19.9	0.100 UJ	49.4	9.56
GM-9	11-13-91	18.5	7.05	45.7	0.100 U	52.7	10.08
	03-11-92	14.3	6.70	5.07	0.100 UJ	60.1	10.6
GM-10	11-13-91	9.98	3.62	21.4	0.121	40.2	12.39
	03-11-92	9.50	3.08	24.4	0.187 J	55.0	15.4
GM-11	11-13-91	12.5	0.571	9.56	0.100 U	36.2	0.044
	03-11-92	12.8	0.522	10.2	0.100 UJ	82.5	0.050 U
GM-12	11-13-91	10.5	2.74	6.22	0.100 U	37.2	5.44
	03-12-92	11.6	0.198	24.1	0.100 U	42.8	6.04
MW-12	11-12-91	17.8	0.359	54.1	0.100 U	66.2	0.028
	03-10-92	15.6	0.348	46.2	0.100 U	68.0	0.050 U
TW-14	03-12-92	13.0	10.2	45.9	0.100 UJ	65.8	30.4
RINSATE	11-12-91	0.179	0.100 U	0.155	0.100 U	0.100 U	0.015
	11-13-91	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.030
	03-09-92	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.050 U
	03-10-92	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.050 U
	03-11-92	0.100 U	0.100 U	0.100 U	0.100 UJ	0.100 U	0.050 U
	03-12-92	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.050 U

U Not detected above given detection limit.

J Estimated value.

N Nitrogen.

mg/L Milligrams per liter.

* Duplicate sample from GM-5. November 1991 and March 1992 duplicates are labeled GM-13 and TW-27, respectively, in the field and lab records.

TABLE 4d. ADDITIONAL INORGANIC ANALYTES AND RADIONUCLIDES
ANALYTICAL RESULTS FOR GROUND-WATER SAMPLES
SIEMENS NUCLEAR POWER CORPORATION FACILITY, RICHLAND, WASHINGTON
PROJECT NO. WA183.03

Well Number	Date Sampled	Alkalinity (mg/L)	Acidity (mg/L)	TDS (mg/L)	Gross Alpha (pCi/L)	Gross Beta (pCi/L)
GM-1	11-12-91	111	10.0 U	NA	10 +/- 6	15 +/- 6
	03-09-92	109	10.0 U	231	2.9 +/- 3.1	12 +/- 3
GM-2	11-12-91	135	10.0 U	NA	19 +/- 8	22 +/- 4
	03-10-92	132	10.0 U	256	1.6 +/- 2.2	5.5 +/- 2.0
GM-3	11-12-91	155	10.0 U	NA	35 +/- 14	47 +/- 7
	03-12-92	166	10.0 U	342	7.4 +/- 3.5	13 +/- 3
GM-4	11-12-91	121	10.0 U	NA	80 +/- 21	66 +/- 9
	03-12-92	120	10.0 U	356	9.7 +/- 3.6	12 +/- 2
GM-5	11-13-91	169	10.0 U	NA	75 +/- 7	82 +/- 4
	11-13-91*	168	10.0 U	NA	78 +/- 8	74 +/- 4
	03-12-92	176	10.0 U	465	78 +/- 9	87 +/- 4
	03-12-92*	177	10.0 U	452	64 +/- 9	83 +/- 5
GM-6	11-13-91	155	10.0 U	NA	59 +/- 16	58 +/- 10
	03-10-92	169	10.0 U	315	4.8 +/- 3.6	14 +/- 3
GM-7	11-13-91	151	10.0 U	NA	46 +/- 14	38 +/- 9
	03-11-92	151	10.0 U	293	1.9 +/- 3.7	15 +/- 4
GM-8	11-13-91	105	10.0 U	NA	60 +/- 15	65 +/- 8
	03-11-92	156	10.0 U	355	11 +/- 5	49 +/- 5
GM-9	11-13-91	116	10.0 U	NA	54 +/- 12	62 +/- 6
	03-11-92	127	10.0 U	518	23 +/- 7	60 +/- 6
GM-10	11-13-91	104	10.0 U	NA	39 +/- 9	66 +/- 5
	03-11-92	117	10.0 U	363	9.2 +/- 3.7	60 +/- 4
GM-11	11-13-91	154	10.0 U	NA	5.3 +/- 2.8	10 +/- 2
	03-11-92	165	10.0 U	330	2.6 +/- 3.2	16 +/- 4
GM-12	11-13-91	150	10.0 U	NA	87 +/- 20	90 +/- 11
	03-12-92	162	10.0 U	385	21 +/- 6	38 +/- 5
MW-12	11-12-91	169	10.0 U	NA	9.8 +/- 5.4	59 +/- 5
	03-10-92	167	10.0 U	566	6.8 +/- 5.6	80 +/- 7
TW-14	03-12-92	133	10.0 U	489	40 +/- 8	66 +/- 4
RINSATE	11-12-91	1.00 U	10.0 U	NA	0.6 +/- 1.0	1.8 +/- 1.6
	11-13-91	1.00 U	10.0 U	NA	0.0 +/- 1.0	1.6 +/- 1.6
	03-09-92	1.00 U	10.0 U	10.0 U	0.6 +/- 1.1	1.2 +/- 1.6
	03-10-92	1.00 U	10.0 U	10.0 U	0.3 +/- 1.0	2.6 +/- 1.6
	03-11-92	1.00 U	10.0 U	10.0 U	0.0 +/- 1.0	1.9 +/- 1.6
	03-12-92	1.00 U	10.0 U	19.0	0.0 +/- 1.0	2.9 +/- 1.6

U Not detected above given detection limit.

J Estimated value.

NA Not analyzed.

TDS Total Dissolved Solids.

mg/L Milligrams per liter.

* Duplicate sample from GM-5. November 1991 and March 1992 duplicates are labeled GM-13 and TW-27, respectively, in the field and lab records.

TABLE 4e. FIELD PARAMETERS
ANALYTICAL RESULTS FOR GROUND-WATER SAMPLES
SIEMENS NUCLEAR POWER CORPORATION FACILITY, RICHLAND, WASHINGTON
PROJECT NO. WA183.03

Well Number	Date Sampled	Temperature (degrees C)	pH (standard units)	Specific Conductance (umhos/cm)	
GM-1	11-12-91	17.5	7.7	385	
	03-09-92	16.7	7.8	350	J
GM-2	11-12-91	18.5	7.7	363	
	03-10-92	15.9	7.6	390	J
GM-3	11-12-91	20.2	7.6	483	
	03-12-92	18.3	7.7	570	J
GM-4	11-12-91	19.3	7.4	557	
	03-12-92	17.6	8.2	670	J
GM-5	11-13-91	17.0	7.4	749	
	11-13-91*	NA	NA	NA	
	03-12-92	17.0	7.5	770	J
	03-12-92*	NA	NA	NA	
GM-6	11-13-91	13.7	7.6	463	
	03-10-92	18.6	7.7	520	J
GM-7	11-13-91	13.2	7.8	418	
	03-11-92	16.6	7.7	480	J
GM-8	11-13-91	13.6	7.3	552	
	03-11-92	16.6	7.2	620	J
GM-9	11-13-91	14.2	7.4	832	
	03-11-92	17.4	7.5	800	J
GM-10	11-13-91	15.1	6.9	537	
	03-11-92	17.9	6.8	580	J
GM-11	11-13-91	15.2	7.3	503	
	03-11-92	17.0	7.4	520	J
GM-12	11-13-91	15.5	7.4	607	
	03-12-92	17.0	7.6	600	J
MW-12	11-12-91	15.1	7.3	936	
	03-10-92	14.8	7.2	960	J
TW-14	03-12-92	18.7	8.4	820	J

J Estimated value because field instrument was calibrated to only one known standard.
NA Not applicable.
umhos/cm Micromhos per centimeter.
C Centigrade.
* Duplicate sample from GM-5. November 1991 and March 1992 duplicates are labeled GM-13 and TW-27, respectively, in the field and lab records.

TABLE 5. SUMMARY OF DATA VALIDATION RESULTS FOR MARCH 1992 CHEMICAL ANALYSES
SIEMENS NUCLEAR POWER CORPORATION FACILITY, RICHLAND, WASHINGTON
PROJECT NO. WA183.03

Analyte	Sampling Event	Qualifier Code	Samples Flagged
<i>Volatile Organic Compounds</i>			
TCE	Nov-91	B (1)	GM-3, GM-5, GM-6, GM-7, GM-8, GM-9, GM-10, GM-11, GM-12, GM-13*, MW-12
	Nov-91	U (7)	GM-4
Acetone	Nov-91	U (6)	GM-5, RINSATE 11/12/91, TRIP BLANK 11/12/91
	Mar-92	U (5)	GM-1, GM-2, GM-7, GM-8, MW-12, RINSATE 3/10/92, RINSATE 3/12/92
	Mar-92	U (8)	GM-2, MW-12
Methylene chloride	Mar-92	U (5)	GM-1, GM-2, GM-3, GM-5, GM-6, GM-7, GM-8, GM-9, GM-11, MW-12, TW-27*, RINSATE 3/9/92, RINSATE 3/10/92, RINSATE 3/11/92, RINSATE 3/12/92
	Mar-92	U (6)	GM-3, GM-5, GM-9, GM-11, TW-27*, RINSATE 3/12/92
	Mar-92	U (8)	GM-1, GM-2, GM-3, GM-5, GM-6, GM-7, GM-8, GM-9, GM-11, MW-12, TW-27*
Chloroform	Nov-91	U (9)	GM-4
	Mar-92	U (9)	GM-4
<i>Wet Chemistry</i>			
Ammonia	Nov-91	J (2)	GM-4
Ortho-phosphate	Mar-92	UJ (3)	GM-7, GM-8, GM-9, GM-11, RINSATE 3/11/92
	Mar-92	J (3)	GM-10
<i>Metals</i>			
Barium	Nov-91	B (4)	GM-1, GM-2, GM-3, GM-4, GM-5, GM-6, GM-7, GM-8, GM-9, GM-10, GM-11, GM-12, GM-13*, MW-12
	Mar-92	B (4)	GM-1, GM-2, GM-3, GM-4, GM-5, GM-6, GM-7, GM-8, GM-9, GM-10, GM-11, GM-12, TW-14, TW-27*, MW-12
Calcium	Mar-92	B (4)	RINSATE 3/9/92, RINSATE 3/10/92, RINSATE 3/11/92
	Mar-92	U (10)	RINSATE 3/12/92
Iron	Nov-91	B (4)	MW-12
	Nov-91	U (10)	GM-6, GM-7, GM-9, GM-10, GM-12
	Nov-91	J (3)	GM-1, GM-2, GM-3, GM-4, GM-5, GM-6, GM-7, GM-8, GM-9, GM-10, GM-11, GM-12, GM-13*, MW-12, RINSATE 11/12/91, RINSATE 11/13/91
	Mar-92	B (4)	GM-1, GM-8, RINSATE 3/10/92
	Mar-92	U (10)	GM-3, GM-12
	Mar-92	U (9)	GM-2, MW-12

Notes on next page.

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TABLE 5. SUMMARY OF DATA VALIDATION RESULTS FOR MARCH 1992 CHEMICAL ANALYSES
SIEMENS NUCLEAR POWER CORPORATION FACILITY, RICHLAND, WASHINGTON
PROJECT NO. WA183.03

Analyte	Sampling Event	Qualifier Code	Samples Flagged
<i>Metals (continued)</i>			
Magnesium	Mar-92	B (4)	RINSATE 3/9/92, RINSATE 3/10/92
	Mar-92	U (10)	RINSATE 3/12/92
Manganese	Nov-91	B (4)	GM-1, GM-3, GM-4, GM-6, GM-9, MW-12
	Mar-92	B (4)	GM-1, GM-3, GM-4, GM-6, GM-8, GM-9, GM-11, GM-12, MW-12, TW-14
Potassium	Nov-91	B (4)	GM-1, GM-2, GM-4
	Mar-92	U (10)	RINSATE 3/9/92, RINSATE 3/11/92, RINSATE 3/12/92
Sodium	Nov-91	B (4)	RINSATE 11/12/91, RINSATE 11/13/91
	Mar-92	B (4)	RINSATE 3/10/92
	Mar-92	U (10)	RINSATE 3/9/92, RINSATE 3/11/92, RINSATE 3/12/92
<i>Field Parameters</i>			
Conductivity	Mar-92	J (11)	GM-1, GM-2, GM-3, GM-4, GM-5, GM-6, GM-7, GM-8, GM-9, GM-10, GM-11, GM-12, TW-14, TW-27*, MW-12

- * Duplicate of GM-5
- TCE Trichloroethene
- U The material was analyzed for, but not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- UU The material was analyzed for, but not detected. For inorganic analytes, the associated value is an estimate and may be inaccurate or imprecise. For organic analytes, the sample quantitation limit is an estimated quantity.
- J The associated value is an estimated quantity.
- B Analyte detected in laboratory blank, except with explanation (4)
- (1) Compound found in associated blank as well as in sample.
- (2) Matrix spike recovery outside quality control limits.
- (3) Laboratory duplicate relative percent difference outside quality control limits.
- (4) Result above the Instrument Detection Limit (IDL), but below the Contract Required Detection Limit.
- (5) Compound detected in trip blank and sample result is greater than IDL and less than 10 times the blank result.
- (6) Compound detected in method blank and sample result is greater than IDL and less than 10 times the blank result.
- (7) Compound detected in method blank and sample result is greater than IDL and less than 5 times the blank result.
- (8) Compound detected in equipment blank (rinsate) and sample result is greater than the IDL and less than 10 times the blank result.
- (9) Compound detected in equipment blank (rinsate) and sample result is greater than the IDL and less than 5 times the blank result.
- (10) Compound detected in preparation blank and sample result is greater than the IDL and less than 5 times the blank result.
- (11) Two point calibration was not performed on conductivity meter.

93120011716

FIGURES

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APPROVED: JB

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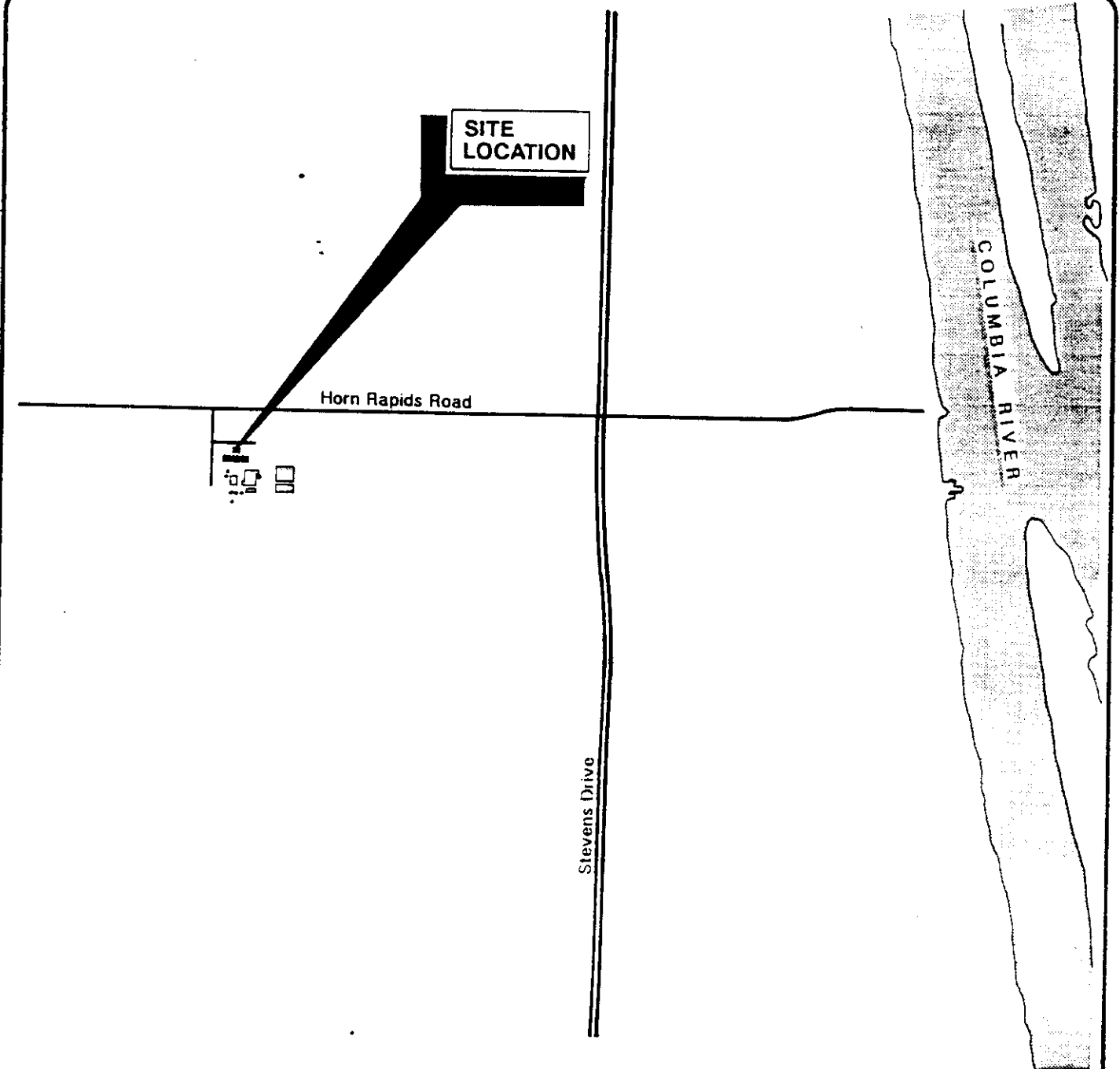
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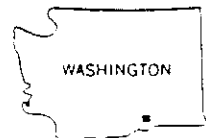
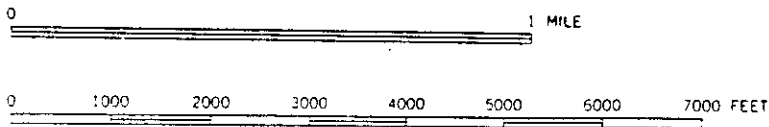
PRJCT NO.: WA18306

DWG DATE: JUNE 1992

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SOURCE: USGS 7.5 Minute Topographic Map, RICHLAND, WASHINGTON Quadrangle Dated 1978.



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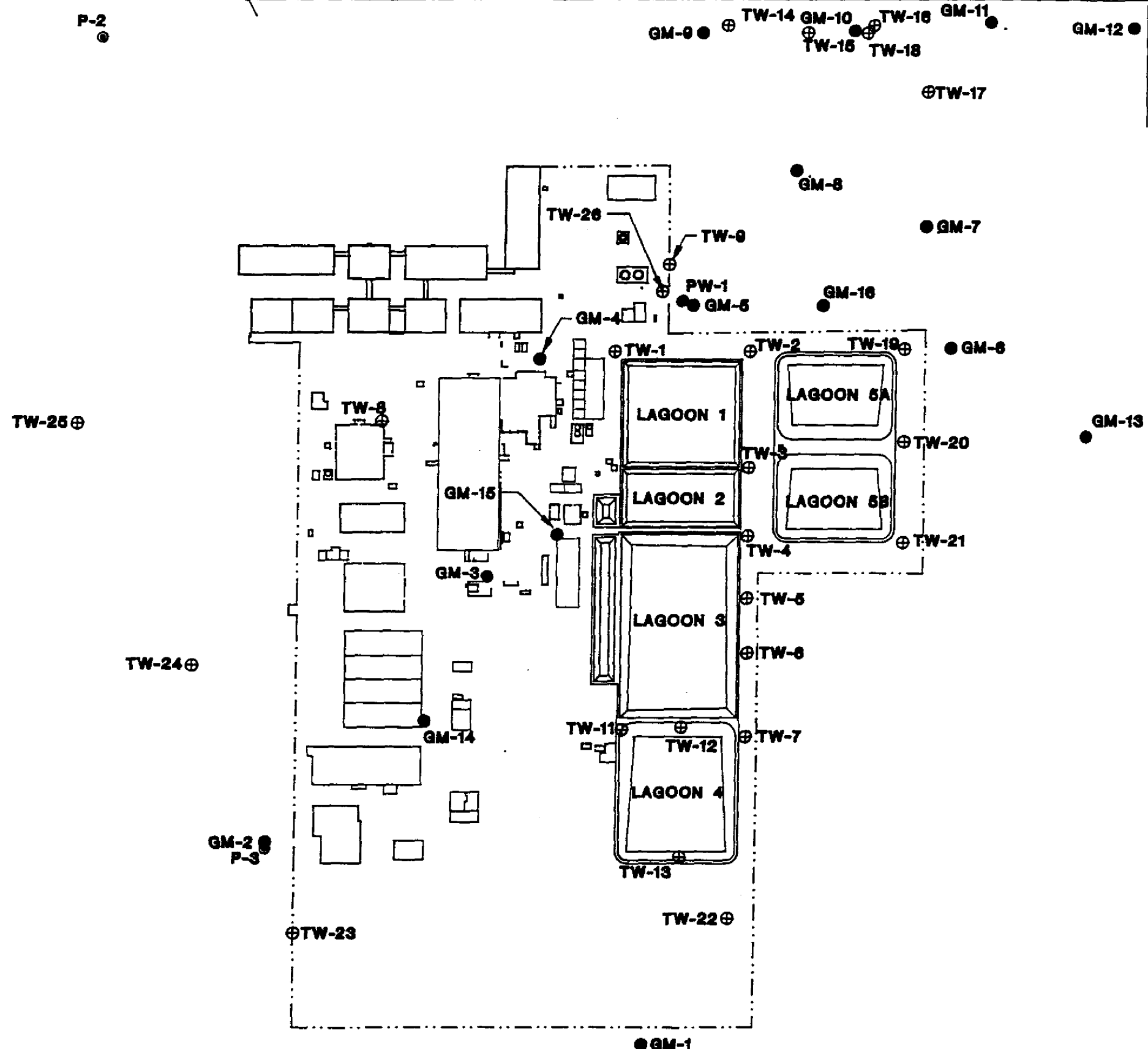
SITE LOCATION MAP
Siemens Nuclear Power Corporation
Richland, Washington

FIGURE

1

DWG DATE: 05-19-92 | PRJCT NO.: WA183.03 | DRAWING: X | CHECKED: JB | APPROVED: LER | DRAFTER: CH

HORN RAPIDS ROAD



LEGEND

- PW-1 Pumping Well
- P-3 Piezometer
- GM-8 SNP Monitoring Wells
- ⊕ TW-22 SNP Test Wells
- Fence Line

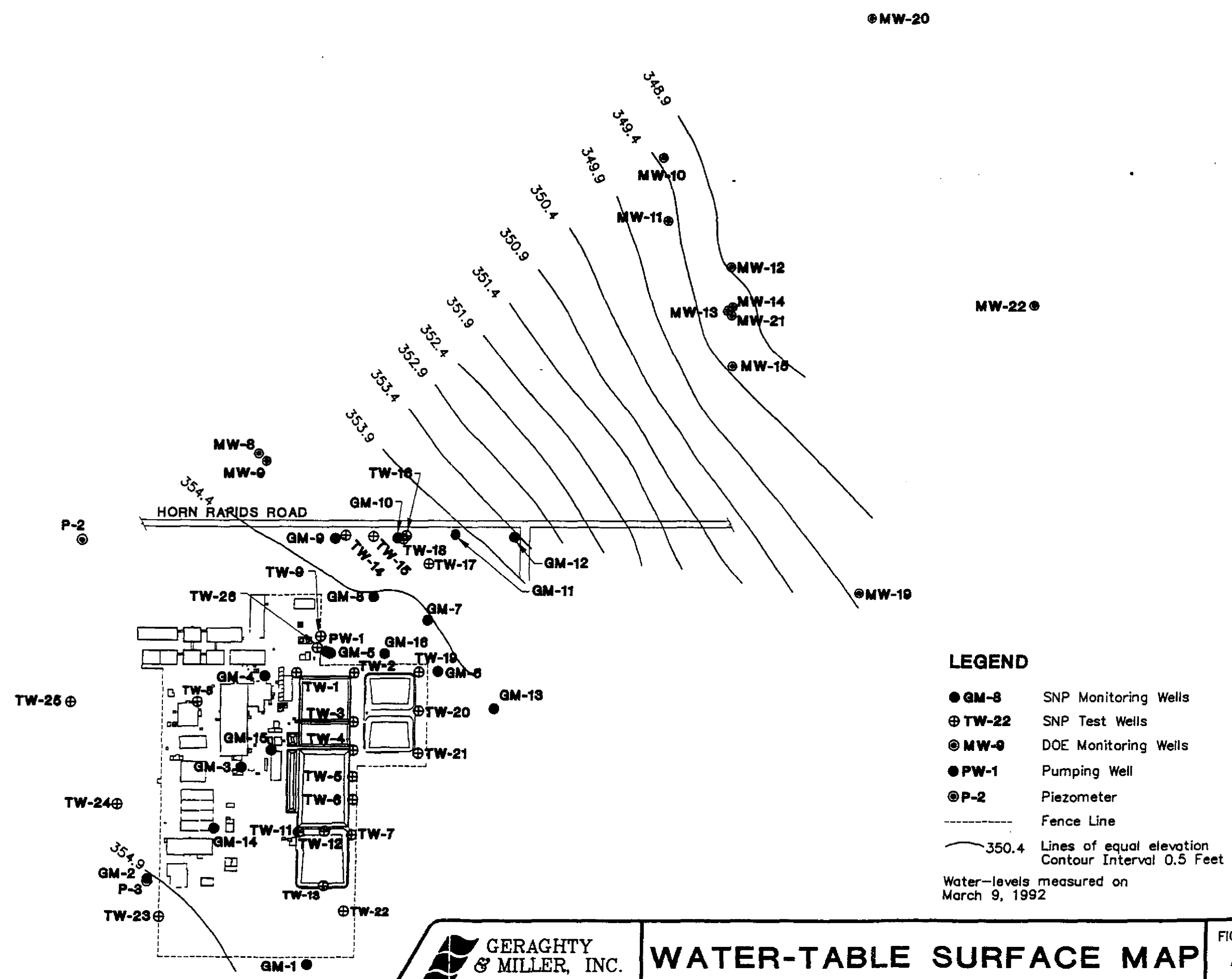
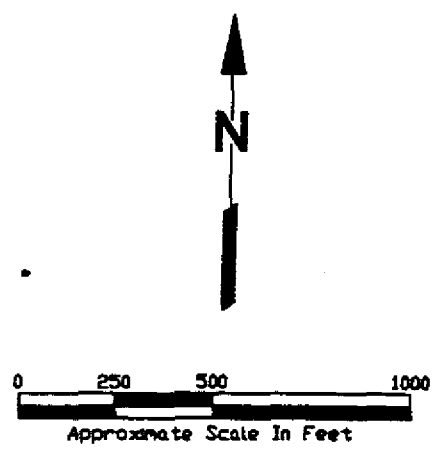
GERAGHTY & MILLER, INC.
Environmental Services

JOB #WA183.03

WELL LOCATIONS
Siemens Nuclear Power Corporation
2101 Horn Rapids Road
Richland, Washington 99352

FIGURE
2

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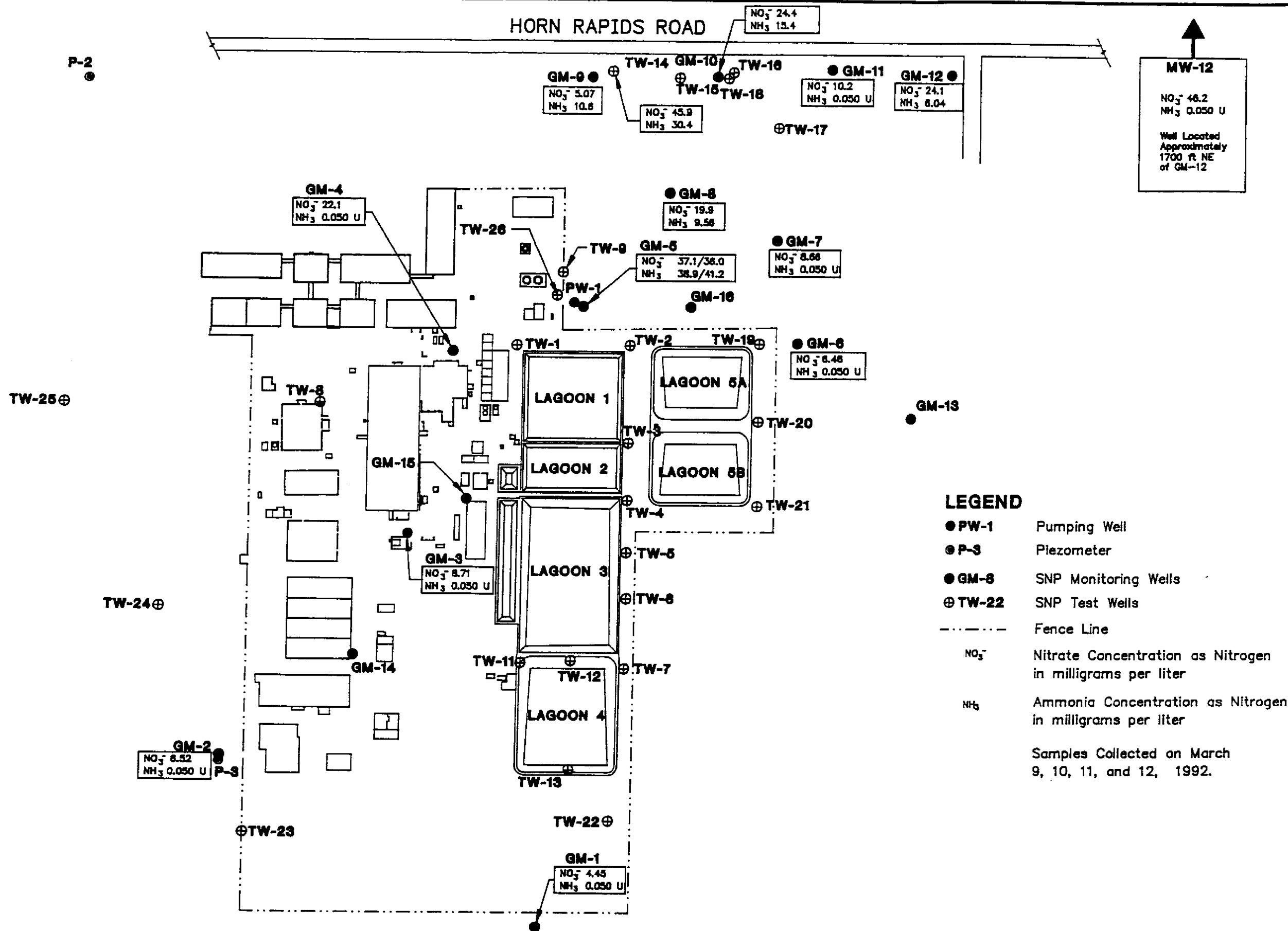
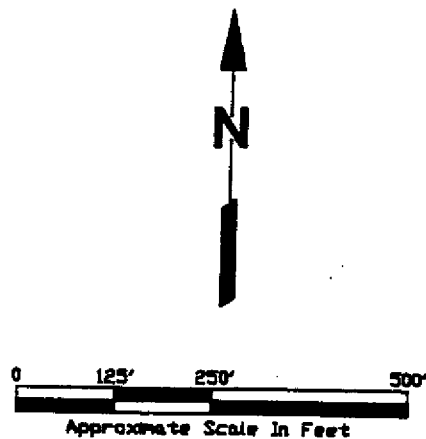
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JOB #WA183.06

WATER-TABLE SURFACE MAP

Siemens Nuclear Power Corporation
 2101 Horn Rapids Road
 Richland, Washington 99352

DWG DATE: 05-11-92 | PROJECT NO.: WA183.03 | DRAWING: X | CHECKED: JB | APPROVED: LER | DRAFTER: CH



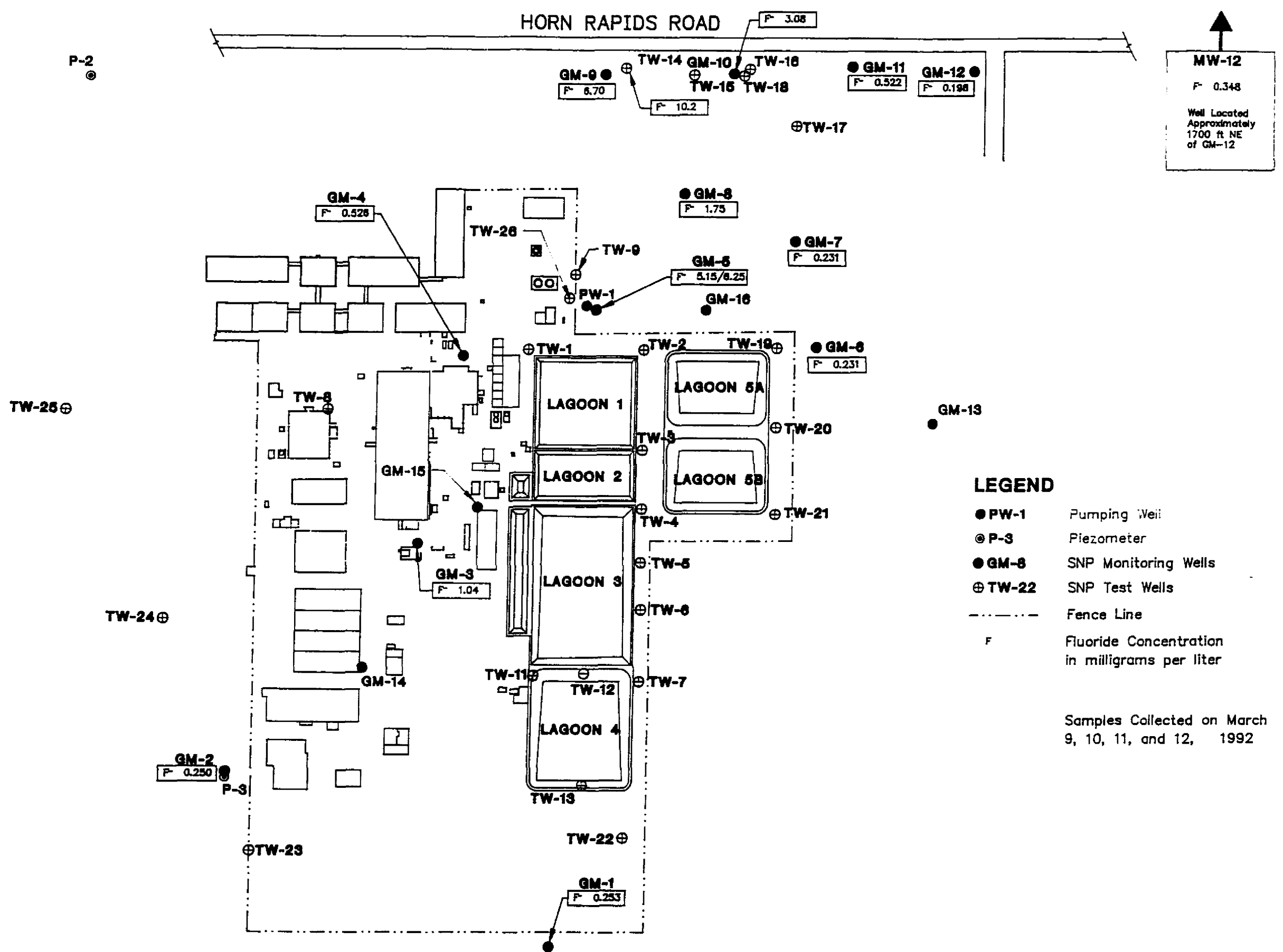
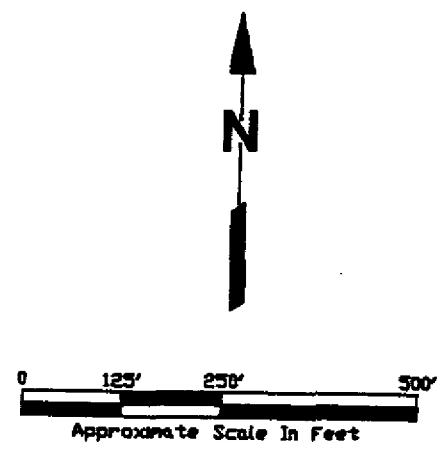
GERAGHTY & MILLER, INC.
Environmental Services

JOB #WA183.03

**NITRATE AND AMMONIA CONCENTRATIONS
IN THE GROUND WATER MARCH 1992**
Siemens Nuclear Power Corporation
2101 Horn Rapids Road
Richland, Washington 99352

FIGURE
5

DWG DATE: 05-11-92 | PRACT NO.: WA183.03 | FILE NO.: WA183.03 | DRAWING: X | CHECKED: JB | APPROVED: LER | DRAFTER: CH

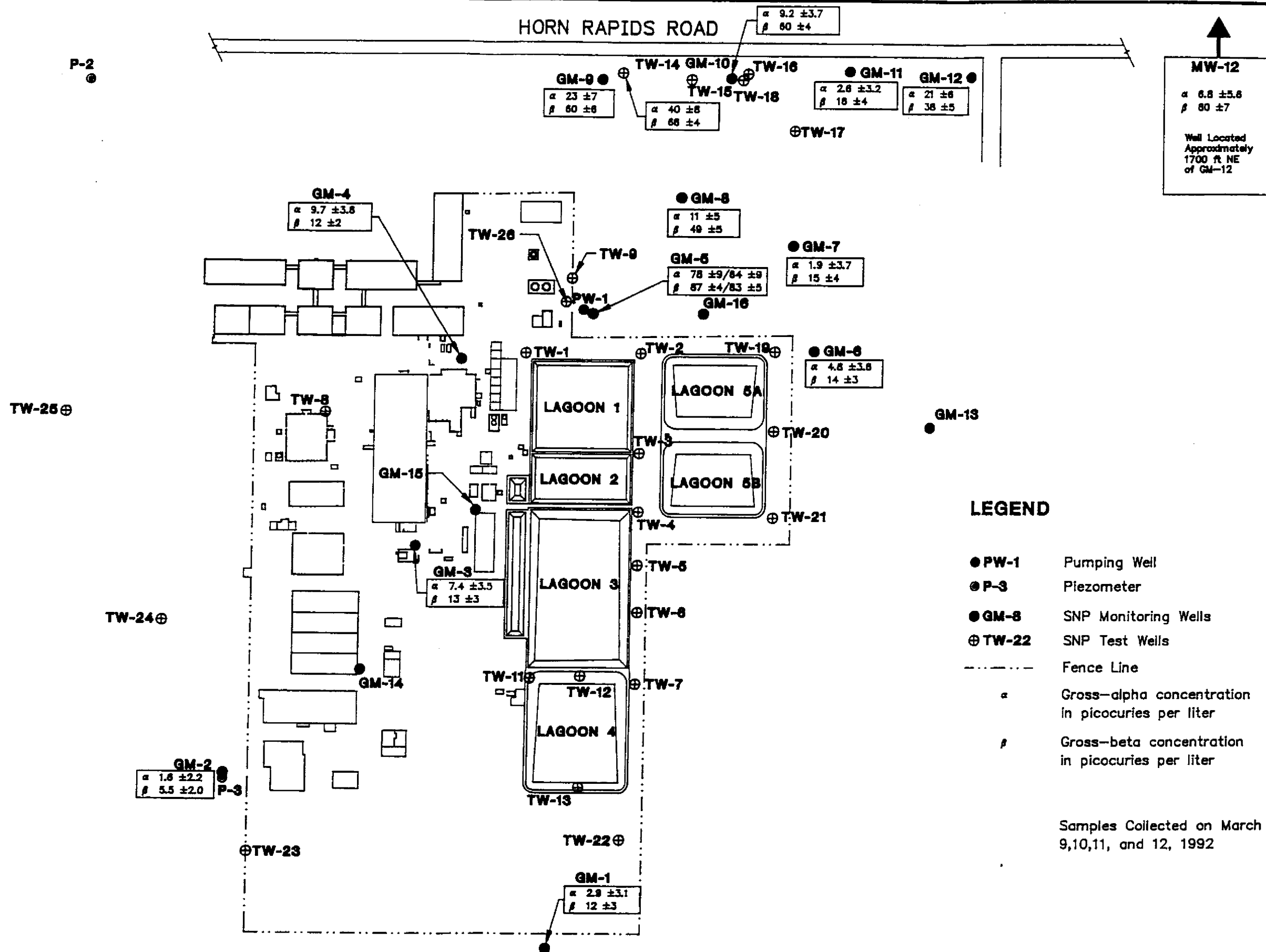
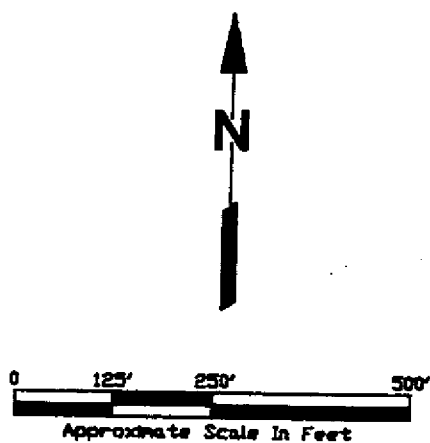


GERAGHTY & MILLER, INC.
Environmental Services
JOB #WA183.03

**FLUORIDE CONCENTRATIONS
IN THE GROUND WATER MARCH 1992**
Siemens Nuclear Power Corporation
2101 Horn Rapids Road
Richland, Washington 99352

FIGURE
6

DWG DATE: 05-18-92 | PRCT NO.: WA183.03 | FILE NO.: WA183.03 | DRAWING: X | CHECKED: JB | APPROVED: LER | DRAFTER: CH



JOB #WA183.03

**RADIONUCLIDE CONCENTRATIONS
IN THE GROUND WATER MARCH 1992**
Siemens Nuclear Power Corporation
2101 Horn Rapids Road
Richland, Washington 99352

FIGURE
7